

CLAIMS

What is claimed is:

1.

A method for injecting a fluid into a woody plant, the method comprising:

(a) providing:

- (i) a fluid reservoir containing a fluid;
- (ii) a carrier gas reservoir containing a carrier gas;
- (iii) a needle having a proximal end and a distal end, comprising:
 - (1) an inner conduit;
 - (2) a sealed tip terminating in a point at the distal end;
 - (3) an outer surface; and
 - (4) at least one aperture connecting the inner conduit and the outer surface and proximate to the point at said distal end; and
- (iv) an injector connecting the fluid reservoir and the carrier gas reservoir to the proximal end of the needle, wherein the injector can direct at least a portion of the fluid from the fluid reservoir with at least a portion of the carrier gas from the carrier gas reservoir, through the inner conduit of the needle and out of at least one of the apertures;

(b) inserting the needle into the woody plant; and

(c) injecting, via the injector, at least a portion of the fluid from the fluid reservoir with at least a portion of the carrier gas from the carrier gas reservoir, through the inner conduit of the needle and out of at least one of the apertures and into the woody plant; thereby injecting the fluid into the woody plant.

2. The method of Claim 1, wherein the woody plant is a tree.

3. The method of Claim 1, wherein the woody plant is a palm tree.
4. The method of Claim 1, wherein the method is repeated one or more times on the same woody plant.
5. The method of Claim 1, wherein the fluid is a treatment for a disease condition.
- 5 6. The method of Claim 1, wherein the fluid is a treatment for an insect infestation.
7. The method of Claim 1, wherein the fluid is a nutrient.
8. The method of Claim 1, wherein the fluid is a suspension.
9. The method of Claim 1, wherein the needle is inserted into expansion tissue.
10. The method of Claim 1, wherein the needle includes two apertures.
- 10 11. The method of Claim 1, wherein ^{at least one aperture} the one or more apertures connecting the inner conduit and the outer surface are at a forward angle relative to the longitudinal axis of the needle.
12. The method of Claim 11, wherein the one or more apertures are at an angle of about 50° to about 130° relative to the longitudinal axis of the needle.
- 15 13. The method of Claim 12, wherein the one or more apertures are at an angle of about 60° to about 120° relative to the longitudinal axis of the needle.
14. The method of Claim 12, wherein the one or more apertures are at an angle of about 65° relative to the longitudinal axis of the needle.

10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

15. The method of Claim 1, wherein at least a portion of the outer surface of the needle between the point and one of the apertures includes a taper.

16. The method of Claim 15, wherein the needle has a first portion from the proximal end to a shoulder point, wherein said outer surface of said first portion has a first taper, and a second portion from the shoulder point to the distal end, wherein said second portion has a second taper which is substantially greater than the first taper.

17. The method of Claim 16, wherein the second taper has an angle of about 10° to about 50° relative to the longitudinal axis of the needle.

18. A method for injecting a medicament into a plant comprising:

- (a) providing a medicament for a plant;
- (b) mixing said medicament with a compressed carrier gas; and
- (c) directing said medicament and compressed carrier gas through the surface of a plant to inject said medicament into the plant.

19. The method of Claim 18 wherein said medicament is selected from the group consisting of: a fertilizer, a pesticide, a fungicide, a growth regulator and a hormone.

20. The method of Claim 18 wherein said carrier gas is selected from the group consisting of: carbon dioxide, air, nitrogen.

21. An apparatus for injecting a fluid into a woody plant, the apparatus comprising:

- (a) a fluid reservoir containing a fluid;
- (b) a carrier gas reservoir containing a carrier gas;
- (c) a needle having a proximal end and a distal end, comprising:

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- (i) an inner conduit;
 - (ii) a sealed tip terminating in a point at the distal end;
 - (iii) an outer surface; and
 - (iv) at least one aperture connecting the inner conduit and the outer surface and proximate to the point at said distal end; and
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- (c) an injector connecting the fluid reservoir and the carrier gas reservoir to the proximal end of the needle, wherein the injector can direct at least a portion of the fluid from the fluid reservoir with at least a portion of the carrier gas from the carrier gas reservoir, through the inner conduit of the needle and out of at least one of the apertures.
22. The apparatus of Claim 21, wherein the woody plant is a tree.
23. The apparatus of Claim 21, wherein the woody plant is a palm tree.
24. The apparatus of Claim 21, wherein the fluid is a treatment for a disease condition.
- 15 25. The apparatus of Claim 21, wherein the fluid is a treatment for an insect infestation.
26. The apparatus of Claim 21, wherein the fluid is a nutrient.
27. The apparatus of Claim 21, wherein the fluid is a suspension.
28. The apparatus of Claim 21, wherein the needle includes two apertures.

Sub B4 29. The apparatus of Claim 21, wherein the one or more apertures connecting the inner conduit and the outer surface are at a forward angle relative to the longitudinal axis of the needle.

5 30. The apparatus of Claim 29, wherein the one or more apertures are at an angle of about 50° to about 130° relative to the longitudinal axis of the needle.

Sub A1 31. The apparatus of Claim 33, wherein the needle has a first portion from the proximal end to a shoulder point, wherein said outer surface of said first portion has a first taper, and a second portion from the shoulder point to the distal end, wherein said second portion has a second taper which is substantially greater
10 than the first taper.

32. The apparatus of Claim 31, wherein the second taper has an angle of about 10° to about 50° relative to the longitudinal axis of the needle.

Sub B5 33. The apparatus of Claim 31, wherein at least one of the apertures is located between the shoulder point and the proximal end.